

THE ZOOLOGIST

No. 234.—June, 1896.

RACES AND RELATIONSHIPS OF HONEY-BEES.

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The Honey-bee originated in a warm climate.

THERE can be no doubt that the Honey-bee was originally an inhabitant of a mild climate, where it could avail itself of the abundant supply of food required by its prolific and reproductive disposition, and where moreover the conditions were most favourable for the development of that particular variation which ultimately produced the extraordinary communal character we find them possessed of at present. None of the allied families of the order (Hymenoptera) which are found indigenous to cold climates show this character to an extent approaching that of the Honey-bee, except some genera of ants; but as these possess the instinctive faculty of excavating, and almost invariably construct their nest in or just above the ground, or in fallen timber, the dense covering of snow protects them during the severe cold of the winter; the development of the burrowing instinct, therefore, enables them to resist the extremes of climatic differences. The Honey-bee, however, not being possessed of such an instinct, has to seek a ready-made home, which she generally finds at some considerable elevation above the surface of the ground, in a hollow

* From the 'Agricultural Gazette of New South Wales,' vol. vi. part 9, pp. 631-642.

tree, that would be exposed to all the rigours of a cold winter. In very warm climates they are able to breed in the open, and there attach the combs on limbs of trees, or under an overhanging ledge of a rock. Under certain conditions they may even seek a very shady place to keep the combs from melting. This habit of building in the open may still be observed amongst domesticated bees that have become feral, and must be inherited from an ancestral race, as it could not well have been acquired in a climate like that of New Zealand, where I once noticed it, and where it would act detrimentally to the survival of the stock. Even in Australia, where it is not an uncommon occurrence, it seems not to be conducive to their prosperity, since the combs I have seen attached to rocks in the northern parts of New South Wales were never very large, nor their builders apparently very numerous. On the other hand, it is well known that bees thrive extremely well in this country when they have nested in a hollow tree, where they obtain sufficient protection against the changes of the weather. They are therefore evidently the production of a tropical or sub-tropical region of the globe, where an equable climate predominates throughout the whole year, for they succumb in colder climates without artificial protection.

It seems fairly certain that the bee has been introduced into many countries at a very early date. Even in remote times they have been found either domesticated or feral in countries which they could not have reached naturally, owing to their geographical position. I will only mention Corsica, an extensive island in the Mediterranean, whence the ancient Romans drew large supplies of wax. The bee could never have reached an island except by artificial introduction. Many similar cases might be instanced, but it is scarcely necessary, as it is well known to naturalists that even when the multiplication of an insect merely depends upon a single pair, or perhaps only upon a pregnant female, its distribution becomes frequently limited through geographical barriers, such as mountains or water, it is obvious that the Honey-bee could not establish itself in a new locality, when it would have to encounter such difficulties, because it would require at least a swarm, with a fertile queen, to do so. The expansion of the species could not take place except by an open landway, and therefore must have been artificially assisted when natural obstacles intervene.

All Bee-races have descended from one type.

No reasonable objection exists against the theory that all known domesticated bee-races and their sub-races descended from one original stock. Experience proves that all the domesticated races of the Honey-bee and their varieties freely intercross, and are fertile; their mongrel offsprings are perfectly fertile likewise with each other, and the parental races as well. Such is quite sufficient evidence of their descent from one species, for it has been observed as an almost invariable fact, that when once varieties have been modified to such an extent as to become true species, the offsprings of their hybrids, as a rule, are sterile. The opinion held by some naturalists that, through lengthy domestication, this tendency towards sterility in the offsprings of hybrids, when they can be made to breed at all, becomes gradually obliterated, cannot well be applied to bees, which, though called domesticated, are not so in the same sense as other animals, which are kept more or less in confinement, and are fed and tended.

To decide what was the original type of the Honey-bee is a matter surrounded by great difficulties, and therefore it may not be possible to produce unquestionable proof of its appearance and character at the present date, but certain indications point to the probability of its being closely allied to either the "brown" or the "Egyptian" bee. These signs are principally manifested in the tendency of the reversion of certain crosses towards the colour of one or other of these races. Before, however, discussing the interesting phenomenon of "reversion," or "throwing back," towards an original type, it will be as well to consider the principal races of the domestic bee so far as they are known at present.

The Races and their Varieties.

1. *The "Brown" or "Northern" Bee (Apis mellifica).* — Is of a uniform dark brown colour, sometimes greyish when young, owing to the greater quantity of hair with which it is covered at this age; the hair is of a dirty yellow colour, as a rule, but sometimes shiny; with some strains an indistinctly reddish brown band makes its appearance on the first abdominal segment.

This bee is found throughout Europe, some parts of Asia, in Algeria, and round the west coast of Africa, in the Old World. It was early introduced into America and the Cape of Good Hope,

and within this century to Australia. The Spaniards introduced it into Mexico and Central America soon after the conquest of those parts, and later into Cuba, where it has thriven exceedingly well ever since. From this island it was probably first brought to the Southern States of North America, where it became feral as in the Cape Colony and Australia. This shows that a tropical or subtropical, as well as a warm climate, is equally agreeable to this race, and the term "northern" is not specially applicable to it. No doubt it received this name on account of its domestication in somewhat remote times in Germany and England, whence it became known through the literature of these nations.

The following varieties or geographical sub-races must be distinguished:—

(a) *The "Heath Bee" of Luneburg.*—This variety is found throughout the high moors of Northern Germany, and nowhere else. In colour and size it is identical with the Brown bee, but it is characterised by its strong swarming propensity, which most likely has to a large extent been purposely cultivated to suit the prevailing system of bee-keeping in those parts of the country.

(b) *The "Nether-Austrian" Bee.*—This variety seems not to be very widely distributed, and is mainly found to the east and the south of Vienna. It is slightly lighter in colour than the typical race, and the greatest number of them have the first abdominal segment coloured reddish brown, some specimens very markedly so.

(c) *The "Carniolian" or "Carinthian" Bee.*—A widely distributed South European variety, but predominating in the two Austrian provinces after which it is named. It is slightly larger than the Brown bee, with whitish hairs fringing the abdominal segments on their lower margins, which gives it when young a very bright appearance. It is famous as being the mildest-tempered among all the domesticated bees.

(d) *The "Attic" or "Cecropean" Bee*, also called "*Hymettus*" *Bee* (from Mount Hymettus, near Athens).—It was considered a distinct species by naturalists, and therefore is known as *Apis cecropia*. Besides the home it is named after, this distinct variety is found all over Greece, and is said to occur in Upper Italy and Spain. It is probably also found in Asia Minor and the islands of its western coast. It is slightly smaller than the Brown bee,

and occasionally rather more hairy ; the first, and more or less the second, abdominal rings are bronzy-brown-red, or sometimes rusty-red.* By some it is considered a cross-tempered race. Berlepsch says :—"Küchenmeister thinks that the Cecropean race stands midway between the native (German) and the Italian race of *noble colouring*, and that it is identical with the one occurring in the Canton Tessin, which is distributed from Mona under the name of Italian. I am inclined to agree with him."

The Attic bee has a classic as well as a legendary reputation, for, besides being mentioned by Grecian writers, it is said that the Athenians, who were great bee-keepers in olden times, asserted that all bees in the then known world had sprung from Mount Hymettus. It is by no means impossible that this legend is based upon some fact regarding the distribution in a westerly and north-westerly direction, although it is more likely that the original type of the domesticated bee occurred much further east than Greece.

Besides the four varieties mentioned, I have not the least doubt that there is a far greater number to be found which differ from the ordinary Brown bee in physical or mental characteristics. These will be found in more or less isolated regions, as it is generally acknowledged that isolation frequently produces alterations, which may be passed over by ordinary observers, and cannot be determined from dead specimens.

2. *The Egyptian Bee (Apis fasciata)*.—This is the furthest removed from the brown race of bees. In size it is nearly a third less ; its colour is light, owing to the anterior part of the first three abdominal segments being yellow, and the hair of the thorax and on the posterior margins of the abdominal rings, &c., being light yellow and sometimes whitish ; the upper part of the thorax between the wings is also yellow. A mild-tempered race on the whole, but when once excited, a very vicious stinger.

The extent of its distribution is very considerable, for, besides Egypt, it is found in Arabia, Syria, and other eastern countries through the central parts of Asia into China. No doubt, when critically examined, it will be found to vary more

* Berlepsch describes the queen as of ordinary size, and bronze-red to the end of the second abdominal ring, and from there brownish black, just like a poor cross of the native (German) and the Italian race, in which the native blood strongly predominates.

or less in distant localities, but evidently not to such an extent as to allow of their variability in dead specimens being observed.

The Egyptian bee is probably the oldest race known to mankind. The earliest positive reference to bees occurs in the Egyptian hieroglyphic monuments of the ancient history of that country. Two thousand years before the present era they are found to represent the symbol of monarchical government, which proves for certain that the economy of the hive was known to this people, and makes it very probable that the bee was domesticated before those remote days. A much older people, the Indians, used honey and drank mead; the earliest known cultured people, it appears, disseminated the knowledge of a more extended use of honey, besides other useful knowledges and arts. Since both agriculture and stock-breeding had reached the highest proficiency in India and Egypt,* it appears more than probable that bees were cultivated as well, especially since no other source is known from which saccharine matter could be drawn for the enormously dense population of those countries. When the Jews were driven out of Egypt, Moses soothed their tribulation by promising them a land where milk and honey flowed, which may, figuratively, mean a land of plenty, but most assuredly proves honey to have been a coveted and familiar product.

The supposition of an early domestication of the bee is justified by the fact that the silkworm is known to have been systematically reared in China for upwards of 5000 years back. As the product of this insect must be considered entirely a luxury in a country which yields abundant fibre from various plants, the demand for it cannot be compared with that of such pleasant and nutritious food as honey, for which, besides, no substitute was known in those days. It is more than likely that the bee was domesticated by man over 6000 or even 7000 years, or longer, ago, for so long it is known that cultured people have existed, and in densely populated countries the supply of wild honey would not cover the demand. All uncultured people are fond of sweets where such are found in nature; they either rob the insect

* Grafting of trees and gelding animals was practised in those countries. In Egypt the bull which symbolised Osiris required to be perfectly white, with certain well-defined marks on the body. After the death of this bull it was always replaced by another. To enable the priests to do this they must have been most careful breeders.

that gathers it for its own food, or they take it from the flowers direct, as, for instance, the aborigines in Western Australia, who suck with pleasure the *Banksia* flowers, which in consequence have been named "honeysuckle" by the whites. The inherited liking for sweet food, it is well known, is increasing rather than diminishing with the progress of civilisation, and when the ancient Indians more than 6000 years ago discovered what a pleasant beverage mead is, the demand for honey must have increased enormously, quite enough, I should think, to encourage systematic apiculture, which, however, probably existed long before that time.

The known varieties standing nearest to the Egyptian bee are the Syrian and the Cyprian. The colour of these is exactly like that of the Egyptian, except that the hairs are not so light. They differ, however, in size from the latter, as both varieties are nearly as large as the Brown bee. The Cyprian besides differs considerably from the Egyptian in temperament, for its viciousness is notorious.

Although the Brown bee, *Apis mellifica*, and the Egyptian bee, *A. fasciata*, differ most from each other among the domesticated races, still they are not species. They can only be regarded as varieties, or, perhaps more correctly, as geographical races. They are perfectly fertile *inter se*, and their offspring are so likewise. Which, however, of these two races most resembles the original type whence they and all the other domesticated varieties have primarily sprung, it is difficult to determine, but it seems to me that the Brown bee probably resembles it most, and may in appearance perhaps not have been modified to any great extent. This point will be discussed further on, when I come to speak of the law of variation, and the tendency of reversion to the original type. Meantime I must say something of another race, namely :—

The Ligurian Bee.—This bee, when first discovered by Spinola, was by him considered a good species, and therefore named *Apis ligustica*. It possesses the typical bands of the Egyptian bee and its near varieties, but its thorax is uniformly brown, and is not marked yellow like with these. Although breeding fairly true as to colour, which is a sure sign of a long pre-existence of such a characteristic, it is probably not a true geographical race, but is a cross between the Brown and the Egyptian bee. How this

cross was first naturally brought about I will try to explain further on, but that it is a fact cannot be doubted, since the race has been artificially produced by a cross between these bees.

Mr. F. W. Vogel, who stands next to Dzierzon among the scientific apiarists of the continent of Europe, published, in 1883, his work on the Honey-bee, wherein he describes the extensive experiments he made by crossing various races by selection. He found that when the Brown and the Egyptian bees were crossed, the offsprings of the first generation exhibited mixed characteristics of both parents; but in the second generation a true Ligurian race became the result, which remained true to the typical colouring if kept pure. He also found that if Italian and Brown bees were successively crossed that the offsprings would throw back by degrees into either of the characteristics of their original ancestors, and not produce a new race. From this the conclusion has been drawn that the Brown and the Egyptian bees are primary geographical races, and that the Ligurian bee is a secondary race produced by a cross of the two primary races under natural conditions. This secondary race must have originated soon after the contact of the two primary ones in Italy.

The Brown bee is still found in some parts of Italy, and most likely was the first to be introduced into that country, probably by the Greeks, if not by the Phœnicians. The Egyptian race must have been introduced later, for the banded bee has been the favourite from the earliest historical times, and if it existed in Italy before the brown bee, this race would scarcely have been introduced. Virgil knew of two races, as may be gathered from the following lines of his fourth Georgic. Describing the Kings, he goes on to say:—*

“The people's looks are different as their King's,
Some sparkle bright, and glitter in their wings;
Others look loathsome and diseased in sloth,
Like a faint traveller, whose dusty mouth
Grows dry with heat, and spits a mawkish froth.
The first are best”

Why the first are best is not further enlarged upon, but we may suppose that it was practically so in Virgil's time, and that his statement is not the mere expression of an æsthetic fancy.

* Addison's translation.

Variation and Reversion.

Having ventured the statement that probably the Brown bee approaches more nearly the original ancestral type than any other of the domesticated races, I will try to explain my reasons for this theory; but as this opinion is based upon the law of variation, and the tendency of some variations towards reversion, or throwing back, to the original type, it is necessary to say something about this law, and the tendency which generally, more or less, accompanies it.

The disposition towards variation exists throughout all nature, and must be apparent both in plants and animals to every observer. It is only necessary to refer to what is daily achieved by the skill of nurserymen and agriculturists on the one hand, and by breeders and fanciers on the other; but these would not be able to produce variations and races, which are often quite different in appearance from the original type, were it not that a disposition of variation exists within every organism. Although this law is not entirely under man's command, for the simple reason that it is not perfectly understood, it is extensively made use of by him, either directly or indirectly. Directly, when a certain inclination towards a variation is specially cultivated, and indirectly when the finest and most vigorous strains are selected for the propagation of the race, and by means of modifications which are often exceedingly minute in certain individuals, a gradual change is brought about that will ultimately produce a characteristic variety.

Wherever a tendency towards variation appears, such a tendency may be, and frequently is, intensified by selection, and a new variety often rapidly springs up. It will, however, greatly depend upon circumstances whether a variety will possess sufficient vitality to last, for unless due regard is paid to the propagation of a general stamina, a selection in one direction may prove in the end fatal to the strain.

The gradual adaptation to a new climate, the more abundant supply of food or the reverse, or local geographical conditions, impress themselves upon individuals, and by imperceptible gradations may bring about a variety from the ancestral race. This, however, is merely assisting the law of variation to which the individual bends involuntarily, for, unless this law existed, altered

and unfavourable conditions would ultimately lead to the destruction of the species, instead of these being able to adapt themselves to the altered conditions. The power of adaptation to new conditions in a species is therefore simply another expression of the law of variation.

The most striking proof of the existence of a disposition towards variation is the occasional occurrence of a sudden variation, which is known as a "sport" when appearing in plants, and as a "monstrosity" when among animals. Besides such abrupt and very striking manifestations of this law, a perpetual variability productive of lesser differences pervades all animated nature. This becomes evident when we take into account the minute differences which appear between the individuals of every existing species. It is a well-known fact that not a single animal or plant can be found which is identical with any other of its kind, not even among those that emanated from the same parent at one birth, nor is there a single leaf of the same tree, or the many thousands of them that may be found in the forest, which does not possess some minute peculiarity of its own found in no other of its kind. Through that most powerful and universal law of nature, the law of inheritance, the general character of variation, if beneficial to the individual, may be propagated and increased under natural conditions, and still more so by artificial means; often, indeed, under unnatural conditions. In fact, the law of variation is extensively made use of by man, and worked upon by him through selection, which, under domestication, is frequently carried in a direction that would be disastrous to the existence, or at least very disadvantageous, to the species under natural conditions.

The pig, for example, is bred for the production of flesh and small bones. Through domestication it has lost its abundant covering of hair, and to a large extent its strength of jaws and the size of its tusks. Under the protection of domestication the pig does not suffer by these degenerations, because it is artificially fed, and, where needed, guarded against the extremes of the climate. With natural surroundings these detrimental variations could never have reached the extent we find them to exist, for the obvious reasons that the want of a strong covering of hair would expose the animal to the extremities of the climate, the absence of a strong jaw would hinder it getting sufficient food by

rooting, and the reduced tusks would leave it almost defenceless, and therefore a prey to its enemies.

It is apparent that variations acquired under natural conditions will be propagated only when they are beneficial to the individual of any species among which such a variation is developed. If, therefore, a sport or monstrosity appears, not possessing beneficial advantages, it disappears frequently as suddenly as it sprung up. Small variations, meaning such as are perceptible or more strongly expressed than those minute differences which are to be found between every individual of a species, may, under certain circumstances, be neither beneficial nor disadvantageous to a race. Such variations frequently affect the coloration or markings, say, of a flower or an insect, and, on account of their indifferent effect, remain stable, and produce a local variety. If such variations become more extensive, and predominate among a strain, these, when distributed over a more or less extensive area, form what is termed a geographical race. Further modifications may convert such a variety into a true species.

It is frequently difficult to determine between a species, a geographical race, and a variety, such distinction depending to a great extent upon individual opinion regarding these definitions. A true species is, however, generally defined as a physical modification. This may either be characterised by a disinclination to cross with other species of the same genus, or, if crossing takes place, it is unproductive, or when hybrids are produced—these, as a rule, are infertile among themselves. But, as these characteristics cannot at all times be proved, the definition of species is often arbitrary, because it is generally based upon outward appearances, which may be considerable, and still not have altered the internal character sufficiently to influence the sexual functions. The error into which naturalists fell when they considered the various bees as species is therefore excusable, since only the fertility among each other and of all of them has proved them to be geographical races and varieties.

The stability of certain varieties and geographical races is very remarkable, but when they are subjected to new conditions of life, whether these are climatic or dependent upon a different food-supply, &c., it frequently happens that they are affected by a new impulse of variability, and this may probably to some

extent account for an occasional reversion to the original type ; but under quite normal conditions the reversion to an ancestral type takes place without any apparent reason for it, and seemingly without any influence of external conditions. It must, therefore, be attributed to a latent heredity which from time to time asserts itself by an unprovoked impulse.

This tendency towards reversion is one of the most remarkable phenomena of heredity, which, although very erratic in its appearance, is one of the most valuable evidences for the tracing of species back to an otherwise obscure origin. Did we, for instance, possess nothing but polled cattle or sheep, and occasionally a specimen was born which developed horns, we should be justified in concluding that these animals, by selection under domestication, had lost their organs of defence, but that their ancestors at one time possessed them. In this case we are certain of it, for though the origin of some of the polled races of sheep is not known, yet the occasional birth of a lamb that more or less distinctly develops horns leaves no doubt of their original descent from a horned race.

It will scarcely have escaped the most casual observer that children sometimes do not resemble either of their parents, but are much more like one or the other of their grandparents. In most of such cases it will be found that the blood of the father predominates. Such instances are the simplest presentations of reversion, but occasionally a characteristic makes its appearance which is not found in either parent or grandparent, but can be traced back to a more remote ancestor. In such cases the characteristic in question has lain dormant in the intervening generation. It may also be frequently noticed that a male offspring resembles the maternal grandfather more in some attributes than those of his father. Such interesting occurrence is especially noteworthy, as it is also analogous, and constantly observable, with the procreation of the drone. By reversion, however, must not be understood an entire reversion to the ancestral type. This could scarcely take place under the simplest change of condition, as, for instance, a return to the same climate after the removal to another has been productive of a distinct variation.

Even if the original conditions were most completely reproduced and were to assert themselves in all their complex effects,

the variability of each generation, and, for the matter of that, of each individual, since modified through altered surroundings, would have left its impression upon the race, and thereby have become inheritable. For this reason reversion can manifest itself only in one or the other predominately aboriginally inherited direction, whilst, at the same time, newly-acquired characteristics, whether physical or mental, and which perhaps have obliterated others, may remain more or less stable.

A complete reversion is, therefore, impossible to take place, and what at times becomes observable is only a partial or indicated one, which is always modified by later acquisitions. This applies equally to species, geographical races, climatic races, or varieties. It is obvious that the further either of these are removed from the typical ancestor, the more are the physical or mental peculiarities modified, and in like measure the tendency towards reversion will be modified both in character as well as frequency.

The nearest approach to a complete reversion that is known to me, at least so far as coloration goes, is that of the rabbit, which, as most Australians well know, has in this country assumed, in a comparatively short time, a very uniform greyish fur, as nearly as possible like that of the typical wild European species. But this cannot be solely attributed to the tendency towards reversion, powerful though this tendency happens to be in this animal, but it is greatly assisted by natural selection. In a country like Australia, abounding in birds of prey, those individuals not possessing a protective colouring stand a lesser chance of survival. On the other hand, the reversion is not complete, because the fertility of this pest has enormously increased, which is probably entirely due to climatic influences, since it is found in a near ally—the hare.

The most surprising reversion known to naturalists is, however, that of the *Axolotl*—an amphibian belonging to the Salamander family, which is found in the Lake of Mexico. This remarkable animal has reverted to nearly the exact condition of the larval stages of other species of this genus, but it is sexually perfect and quite prolific. In this case the reversion has extended to a form that occurs in the genealogy of its evolution, under which it appeared in a former epoch of the earth's history.

The Typical Bee dark-coloured.

Having thus given a short account of what is understood by the law of variation, and the tendency of throwing back or reversion, I will now try to apply these laws for the establishment of my argument, that probably the Brown bee most resembles the original type from which all the known domesticated races and varieties have descended.

The characteristic of any animal which is most subject to variability, more especially pronounced when under domestication, is, without doubt, that of colour, and on this account it is, likewise, generally most affected by the tendency towards reversion. Bees form no exception to this rule, and are to a considerable extent subject to this variability, which has been proved by the easy manner in which, during a few years, the yellow colour of some strains has been increased, so that at present four and five yellow-banded, as well as, so-called, golden bees are produced. This variability would have been before now still more intensified, or, at least, would have been even more rapidly accomplished than it has been, if a direct selection between individuals, which show the specially desired colouring, could be made; but such a distinct selection for any special purpose cannot be achieved on account of the peculiar structure of the bees, which necessitates an inflation of air for the purpose of accomplishing the act of coition, and which, therefore, can only take place during the flight of the insects. The strongly-inherited inclination towards a yellow colouring, found in many strains, would almost tend to demonstrate that this was probably the colour of the typical ancestor.

However, it must not be forgotten that when a variation is once acquired it may almost indelibly imprint itself upon a strain, and, under favourable conditions, be accentuated in the descendants. The fact that a number of races and varieties are yellow-banded is, therefore, no proof that their remote ancestors were likewise yellow-banded; on the contrary, a colour variation, unless it appears as a "sport," or is decidedly detrimental to the welfare of a species, may readily be influenced by sexual selection, and become perpetuated. It must also be borne in mind that among insects colour does not always play nearly the same important part that it does, for instance, among reptiles, birds,

or mammals, since with these, under natural conditions, it is almost invariably more or less protective.

I do not mean to infer hereby that the colour is not protective with insects;—in fact, in many instances, and more particularly during the stages of development, it is so to an extraordinary extent; but this is not so universally the case as with the other mentioned classes of animals. It is to a great extent compensated by an extraordinary power of reproduction, and by other protective qualities than that of coloration; as, for instance, offensive odours, the ejection of pungent fluids, or—as is also the case with the bee—with organs of defence, which are frequently venomous. A protective colouring is, therefore, not essentially necessary to the bee, and its variability in this direction is probably but little influenced by natural selection. Consequently, I should not like to attribute the yellow colour of the Egyptian bee to a selection in this direction, although it is suggestive on account of the conformity of the coloration with the general ground tint of the arid regions which this race inhabits.

This seems to be borne out by the fact that the Cyprian bee has not modified its colouring, although the climate and other conditions of life in its habitat differ considerably from those of Egypt and Syria, whence it was undoubtedly introduced, most probably by the Phœnicians; but, on the other hand, its pugnacity and greater strength of flight must be attributed to natural selection, and are the result of an adaptation to altered surroundings. If, therefore, colour variation with these bees cannot be considered protective, and as resulting from natural selection, it must be ascribed to a latent disposition which, under certain not yet explainable external influences, has developed to a considerable extent in certain varieties. This disposition towards the coloration of the abdominal segments is found to pervade nearly all varieties of the Brown bee, and may even be occasionally observed amongst the most uniformly-coloured races, *e.g.* the Heath bee. In the Nether-Austrian variety it is a common occurrence, as also in the Attic bee. In this latter, in fact, it is so pronounced that the Attic bee is, by some, considered identical with the bee found in Tessin, which is very closely allied to the Ligurian. Such a moderate disposition towards coloration in some varieties, and the more distinct one in others, seems to point towards a variability in that direction

rather than away from it, although, perhaps, it may be thought justifiable to consider it equally in favour of an opposite view. If, for instance, it were admitted that the Athenian assertion be true that all bees originated from Mount Hymettus, the question might be readily solved.

As the Attic bee stands about half-way between the Brown and the Egyptian bee, both in colour and in size, it could be said that the variation in the direction of an increase of the yellow colour went together with a diminution of size; and, on the other hand, that the elimination of the red colour occurred together with an increase of size, and in this way the variability had been compensated. The original communal type, however, must have originated long before the bee now inhabiting Mount Hymettus existed, therefore such a commonplace explanation will not stand a scientific test.

It has been pointed out that when once a variability occurs, a continuation of the conditions of life under which it originated tends to increase it, and under natural surroundings to fix it, thus forming a distinct variety. Under methodical sexual selection, it stands to reason, a variability can be increased at a considerably more rapid rate than under the most favourable natural conditions, and it may, moreover, be maintained under conditions of life quite different from the normal ones amongst which it first appeared. This kind of selection, however, must be rigorously continued, in order to counteract the influence of any external effects to prevent what is usually called deterioration, which, perhaps, may more justly be called variation in a different direction, or adaptation to the altered surroundings. The variability of any organism is subject to so many imperceptible influences, and often diverges into such extreme ramifications, that the character of the original stock may become unrecognizable.

The fact that many varieties of bees inherit a yellow colour is no proof that the ancestral type was of a yellow colour, or that the Egyptian race comes nearest to this type. This is, however, only a negative argument, and is not in itself sufficient to establish the claim of the Brown bee to a nearer relationship with the original type than the Egyptian. A more positive argument may be adduced from a study of their tendency towards reversion, which is a universally acknowledged principle of inheritance.

It is a well-known fact that the Ligurian bee, when brought away from its original home, is, to a certain extent at least, subject to colour variation. For the matter of that, a considerable difference exists among the various strains found in Italy, and, as mentioned before, those found in the Canton of Tessin are rather dark, leather-like in the bands, whilst the more southern are of lighter yellow tints. Now such local variations, whilst occurring in their native home, appears frequently in a more pronounced manner when the Italian bees are removed from their original habitat. Queens which are unquestionably purely mated will occasionally produce offspring differing considerably in colour; this is noticeable in the same hatchings sometimes, and between the different hatchings of the same season, and very often between the hatchings of successive seasons. No doubt this is largely due, in many cases, to individual variability, and is not always, or not entirely, attributable to altered conditions of life; still, ever since the Italian bee has become the favourite race, it has been found necessary to renovate the blood at times to prevent deterioration, or for the purpose of keeping them up to the required standard. If this renovation of blood is not attended to, the loss of the high colouring frequently results, and in some cases is soon perceptible. This deterioration may probably be due to altered conditions of life, but it shows, to a certain degree at least, the instability of the colour variation, and seems to indicate this to be a subsequently acquired character, which the typical ancestor did not possess.

Still stronger evidence than this is the tendency towards a dark colour, which is nearly always the case when a stand is left for some time without the infusion of a new, well-coloured strain, or without careful attention being paid to selection. This is generally more noticeable in a large stand than in a small one, and must be accounted for by the fact that a greater mixture of blood takes place between, say, fifty colonies, than between six to ten. In the latter the descendants are more closely related to each other than in the larger number, and, consequently, will remain more uniform on account of the lesser chance of the effect of variation asserting itself in any particular colony. On the other hand, in a large stand all colonies rarely descend from the same swarm, and even if it were the case, their relationship would have

become collateral to a far greater extent than in a small stand, and the effect of individual variability would make itself more felt.

If a large stand is examined, which we will presume has been descended from a first-class coloured Italian strain, and to have been kept unmixed for several years and allowed to increase by natural swarming, it will be found that nearly all colonies vary more or less in colouring, and probably more still in other characteristics. No doubt some extremely fine-coloured colonies will be met with, but the greater number, as a rule, do not come up to the desired excellence. Some cases may perhaps be noticed that are not much better than a cross between a Brown and an Italian bee, and, on the whole, a tendency towards a dark colour is perceptible.

It may be advanced that, as the Ligurian bee is a secondary race produced by a crossing of the Brown and the Egyptian race, the Ligurians are in reality hybrids, and that consequently it is not a very weighty argument to apply the test of reversion upon these bees, as hybrid blood is more subject to reversion than that of a purely-bred variety. Admitting this fact, it must, however, be remembered that the deterioration of the Ligurian bee, which is the same as reversion in this instance, is always stronger towards the dark colour than towards the light, whereas in a true half-blood there should be no greater tendency in the one direction than in the other.*

Moreover, as has been shown, the disposition to vary in the direction of coloured bands prevails among all varieties of the Brown bee, and must, therefore, be considered an innate characteristic of its organisation, and consequently, according to the principle of the frequent accumulation of a variation, should rather assist than check the perpetuity of the yellow bands. That such is at times the case is shown by the crosses between the Brown and the Ligurian bees, which when allowed to breed

* The reversion to an ancestral type must not be confounded with the reversion of a half-blood to a characteristic possessed by one or other strains of the cross. Such a reversion is of common occurrence, but it has not been observed to happen after many generations, and certainly ceases to appear beyond the twentieth generation. This kind of reversion, therefore, cannot apply to the Ligurian bee, which was produced at least two thousand years ago.

among themselves revert in time to the colour of either of their original parents. When this takes place, the appearance of the yellow bands must have been assisted by the natural variability in this direction, which is the characteristic of the Brown bee.

Seeing that the disposition towards coloration occurs in the brown race and that such disposition occasionally asserts itself, the inclination of the Italian race to assume a darker colour, caused undoubtedly by a tendency towards reversion, cannot be due to its more immediate ancestor, but must be attributed to an older inheritance from the original type, which therefore was probably a uniform dark species. It has to be borne in mind that a complete reversion of every characteristic at the same time can never take place, and that even colour, although it is more likely to reappear in perfection than any other characteristic, rarely reverts entirely to its former tone. On account of this it is impossible to give more than a general expression regarding the colour of the original type. Considering, however, that all domesticated bees belong to but one species, which, so far as is known, occurs in two primary geographical races, the Brown and the Egyptian, the tendency towards a dark coloration in their crosses, under certain conditions, seems to me strongly in favour of my suggestion.

NOTES ON THE ORNITHOLOGY OF OXFORDSHIRE, 1894-1895.

By O. V. APLIN, F.L.S.

THE delay in transcribing these notes, as well as the paucity of the notes themselves, arose from my absence from England during the greater part of 1895. Where no other locality is mentioned, the notes refer to the parish of Bloxham.

JANUARY, 1894.

The weather in the early part of the month was very severe. The 4th was the most unpleasantly cold day we had experienced since Jan. 18th, 1881. The east wind was painfully cutting, and the dust terrible; about an inch of snow fell at night. On the night of the 5th the thermometer went down to 6° in a sheltered garden, and must have gone to zero down by the stream. It thawed on the night of the 8th, and the 11th was very mild.

2nd. Two Grey Wagtails seen by my nephew by the brook between Bodicote and Adderbury. This bird was fairly plentiful before the frost of 1890-91, and I believe was at that time established as a breeding species in the district; but it has been very scarce since.

11th. The Rev. J. Goodwin reported large flocks of Bramblings at Milcombe lately. In the frost some came into the stack-yards, and some were shot. Wyatt, the taxidermist at Banbury, had one or two. Many Fieldfares were shot in the frost—thirteen at a double shot. Redwings were very scarce. I had not seen more than two or three all the season. Mr. Warde Fowler, writing on the 19th, said:—"Like you, I see only Fieldfares here now; no Redwings. But just before the frost there were vast numbers of Redwings in the meadows here (Kingham). As soon as the snow was on the ground both species vanished utterly."

16th. At Sarsden I learned that Hawfinches breed there regularly. The "white" Moorhen, sent to the Zoological Gardens thence some years ago, was of a silver-grey colour. Another similar bird occurred about eight years ago, but wandered in a frost, and was probably shot. Red-legged Partridges are numerous there now, and I handled a remarkably heavy young cock this day. I saw a Rook's nest, built last autumn; the young were actually hatched, but probably perished in the frost. Mr. Warde Fowler about this date reported a female Goosander shot on Port Meadow on the 15th.

FEBRUARY.

4th. Warm stormy weather has prevailed from the third week in January.

9th. Some Partridges still unpaired.

11th. Furious gale from the S.W. at night.

14th. Blackbird opened song.

15th. Chaffinches singing.

17th. Rain from 11 p.m. last night to same time to-night; the best rain we have had for two or three years.

19th. I examined, at Mr. Wyatt's shop, a pair of Long-eared Owls, shot at Cornbury Park a month ago.

26th. Mr. Fowler about this time noticed very many Redwings in Christ Church Meadows, Oxford, and one Brambling among Chaffinches.

MARCH.

7th. Had news of some Gulls seen on the 5th here. The second week in this month was very wet and stormy.

17th. Saw a Chiffchaff.

18th. Several pairs of Peewits on the fallows.

26th. Flocks of Fieldfares now, and some Redwings.

APRIL.

3rd. My nephew watched a pair of Nuthatches building; they brought the material from the dead limb of an oak. Three days later they were dispossessed of the hole by Starlings. There was no mud round the edges of the hole, which I saw.

6th. Saw a Barred Woodpecker at Bodicote, and again in this parish the next day.

17th. Saw a Grey Wagtail, in spring dress, in the brook near Wickham Mill.

The season, as shown by the state of the fruit-blossom (very fine this year), and the foliage generally, was extremely forward in the middle of April; according to some old men it was the most forward they remembered. The most remarkable ornithological event of the season was the early arrival of the Cuckoo. It was heard by a competent observer at Milcombe about 7.30 a.m. on April 1st, and the same person saw two birds the next day. An old farmer and several labourers heard it at Tadmarton on the 2nd, as the former truly said, about three weeks before its usual time. Curiously enough it is said, locally, to come to Tadmarton first. Another farmer here reported it on the 5th, and a dozen people heard it at Bloxham on the 8th. I was talking this over with some of the village people, when one of them remarked, "But do he ever go away?" "Well," I replied, "you never see him in the winter, do you?" "No," he answered, "he be the hawk, but he calls cuckoo in the spring." Another old worthy opined that the Cuckoo's voice got broken later on, because he "couldn't get no eggs to clear it!" I may add here that the Cuckoo continued in full song up to June 20th.

21st. I put a Carrion Crow off her nest; she sat until I was close to the tree, and was doubtless incubating. The next day I saw, in a spinney here, a nest with the remains of at least three eggs, which had been knocked out of a tree.

22nd. Saw some Fieldfares.

28th. A Linnet's nest with four eggs in Milcombe gorse, which is early.

MAY.

5th. Saw a pair of Common Sandpipers in Port Meadow, Oxford, and three near Eynsham the next day.

7th. Mr. Fowler and I observed the Reed Warbler at Parson's Pleasure, Oxford, and a Lesser Redpoll, with a beautifully bright red cap, which came down to drink as we stood on the bridge; we could see no red on the bird's breast.

13th. Saw a Jay in a spinney on the hill here, and a noisy pair in an ash-holt near Milcombe four days later; it is quite uncommon to find Jays breeding in the small spinneys about here.

17th. Saw a male Red-backed Shrike on the telegraph-wires at Wickham.

The Nightingale, which has been appearing again in small numbers in this district the last few years, has been observed this month at Bodicote (two birds), Adderbury, Milcombe, and South Newington.

I think a good many Swallows perished in the cold and stormy weather this month.

Mr. Fowler saw a Black-headed Gull, with full dark hood, in Port Meadow this month.

JUNE.

17th. I had news from Mr. Fowler that the Marsh Warbler had come back to the same place it haunted last year.

I heard the Chiffchaff in song continuously up to July 12th, but chiefly very early in the morning in the latter part of the time, and, exceptionally, as late as July 27th in the daytime. Its song ceased then, but recommenced in the last days of August.

30th. I could see no Crested Grebes on Clattercote Reservoir, the water having been very low all the season; there were a few Coots, with young varying from half-grown birds to downy chicks, and two young broods of Wild Ducks.

JULY.

13th. At 11 p.m. I heard the Grasshopper Warbler singing between Hook Norton and Milcombe.

AUGUST.

9th. A Wheatear in immature plumage was shot near Banbury about this date.

Swifts remained rather late. Many were screaming loudly on the 23rd, and a great gathering of them was seen by my brother over his garden at Bodicote. That and the next day were cold; but the Swifts were in full force on the evening of the 26th, and I saw a few on the 27th and 28th. The summer, on the whole, was wet and ungenial.

16th. Mr. Fowler saw an immature Ring Ouzel in a mountain-ash tree in his garden at Kingham.

22nd. Early this morning a shepherd saw two grey Wild Geese, with some Swans and cygnets, on the Sorbrook below Broughton; they flew away on his approach.

SEPTEMBER.

6th. Examined, at Mr. Wyatt's shop, a very small Golden Plover in the flesh, which had been shot in a ploughed field at Wroxton. Axillaries white, marked, on some of them, at the tips, with light dusky brown. This is a most unusual date for this bird to visit Oxfordshire.

9th. Being at Deddington about 8 p.m., I heard Whimbrel passing over, high up.

21st. A little flock of twenty or thirty Meadow Pipits passing over, going south, at no great height, about 5.15 p.m. 26th. A flock of about one hundred at 5 p.m. were going S.S.E. This line of flight would take them into the Cherwell Valley, down which they very likely proceed. I know the flocks get into the valley, but a little later in the year than this. At this season the birds seem to move from the turnip-fields at evening and fly onwards; probably they fly all night, and pitch in another turnip-field at dawn. Meanwhile their place has been taken by others.

28th. In the afternoon (dull with a light N. wind) I distinctly heard the short clear whistle of a Ruff or Reeve, "fü-whit" (there is hardly any break between the syllables) from a bird passing over close to this village.

30th. A fully moulted Pied Wagtail, which passed this sunny morning on the house-roof, sang very prettily at intervals. I had never heard this bird sing in autumn before.

OCTOBER.

13th. Grey Wagtail appeared here; Mr. Fowler saw them at Kingham the day before.

20th. Hardly any Swallows or Martins were to be seen after the 8th, but to-day I saw about a dozen Martins feeding over the village, and there were young birds still in a nest. The weather was very cold in the early part of the month.

22nd. Saw two or three Martins; a very sharp frost the night before. A pair of Swallows built a nest this year in the passage of the "Carrier's Arms" public-house, Adderbury, and, notwithstanding the number of people going in and out, reared their young in safety.

29th. A flock of about a score of Fieldfares appeared.

NOVEMBER.

2nd. Redwings arrived.

5th. A Bittern, shot at Headington on the 3rd, was found by Mr. Fowler in Oxford Market.

There was much rain from the latter part of October onwards, and by the 15th of this month we had the biggest flood we have experienced for fourteen years. A great many Gulls visited this district. Mr. Wyatt had four Kittiwakes in the immature dress, in which stage they are, I believe, not common on the east coast. Mr. Bartlett had nine Kittiwakes (seven of them immature), and two young Herring Gulls.

17th. At Oxford Mr. Fowler and I saw a few Redpolls in Christ Church Meadows.

18th. We saw a Barred Woodpecker at Beckley.

DECEMBER.

6th. Mr. Bartlett showed me a Knot in adult winter dress, shot recently at Tusmore. It is a most unusual visitor to Oxfordshire. Also a Crossbill, an adult male, of a very deep red mixed with clear yellow, the rump being of the latter colour. It was killed in August at Banbury.

21st. Mr. Darbey wrote:—"I had to-day sent me from Witney a Barn Owl, a very fine bird indeed; and instead of the breast being white, or buffy-white with dark spots, it is a deep buff, and the spots only faintly showing. I never before saw an English Owl with such a deeply coloured breast."

1895.

I left England on the 28th December, 1894, and did not return until the 28th June following. I therefore missed the

opportunity of making any notes during the long and terribly severe frost which prevailed in the early part of this year. A few notes came into my hands on my return. Two Little Auks were picked up in an exhausted condition in January. One in Port Meadow, near Oxford, for a note of which I am indebted to Mr. Fowler; the other, found at Charlbury, I examined in Mr. Coombs's shop at Chipping Norton.* Mr. Coombs also showed me a Great Grey Shrike, killed at Hook Norton in the winter of 1894-5, and two of four Spotted Woodpeckers procured in that neighbourhood during the same period. About the first week in February, as Mr. Melliar Foster-Melliar informs me, five or six Wild Swans (probably Whoopers) came to their old haunt, just above Bestmoor in the Cherwell valley, near North Aston. One of the birds was described as being in the brownish dress of immaturity. Mr. Fowler tells me that a Waxwing was seen by a friend of his on Headington Hill, Oxford, in the early part of the year. Two Snow Buntings were shot, and another seen, near Crowmarsh on the 4th of February. When first observed (on the 2nd) they were working about, sometimes among the grass at the sides of the road, and sometimes among the droppings on the road. Mr. W. Newton, in a letter communicating these facts to Mr. Fowler, added that he had a Snow Bunting (from his description, an adult bird) shot at Crowmarsh Battle about twenty years ago, and another shot eight or ten years since. Some Snow Buntings also occurred in Berkshire, but so close to our borders that a notice of them comes fairly within the scope of these notes. They were seen by Mr. Fowler just under Cumnor Hurst on the 6th and 7th. He writes that they were "so tame that they came right up to my feet. . . . The thermometer that morning was 3° below zero." Being out of England I was unable to make any observations on Chaffinches at the end of the winter. But I have a suspicion that the Chaffinches which spend the winter here leave us about the end of January, or in the first days of February. Their places are taken almost immediately by others; at the same time I have more than once remarked that the species had almost entirely disappeared for a few days just before they were to be seen in their usual early spring abundance.

* Since writing this I have heard of three picked up about the same time at Henley-on-Thames.

I hope to make further observation before definitely stating the fact.

JULY.

9th. I went to Kingham to see the Marsh Warbler's nest found by Mr. Fowler. Four eggs had been laid. The next day Mr. Fowler reported that two young were hatched.

AUGUST.

16th. A few Swifts were to be seen on this date, but none after.

SEPTEMBER.

I was sitting under a hedge one day, watching a covey of Red-legged Partridges running in straggling order over a bare stubble, and talking to an old labourer who is very keen on such subjects, when he told me he remembered the first appearance of the bird in this neighbourhood. The first he ever saw was sent from Worton to the late Dr. John Colegrove, of Bloxham (with whom he was then living), over forty years ago. The doctor brought it into the kitchen to show them, and then had it stuffed. The species was said to have been introduced at Worton by a Frenchman (?), who then lived at Upper Worton House, and who imported some, which he kept in confinement for a time, and then turned out. About that time, according to my informant, they began to preserve the game about here.

1st. Blackbird singing faintly. This is the only occasion on which I have heard it sing in autumn; but it was a glorious day, one of the most delicious I have experienced in any country.

18th. A flock of about fifty Grey Geese were reported as flying across the village, and more on the 20th. They were going N.E., which is unusual at this time of year. The appearance of Wild Geese flying over, N.E. and S.W., in spring and autumn respectively, is perfectly well known to some of the inhabitants of this village, the local idea (which is probably a tradition) being that they come "out of the Fens." I have for a long while suspected that we are occasionally visited by Greylag Geese in early autumn, but apparently they very rarely alight here.

I bought (28th August) at a sale of the furniture and effects of an old house—long inhabited by a man who horsed the coaches, and afterwards by his widow—called Bury Barns, Burford, a case containing a male pure-bred *Phasianus colchicus*, a pied male of the same, a Blackcock, and a Golden Plover. It is extremely

likely that all these were local birds. Like everything else in the place, the specimens were very old. The only other bird in the house was a Short-eared Owl, but this had a label still on the case, stating that it was shot on Kennel Fields, 21st October, 1856.

From the 23rd September until the 21st October I was again abroad.

NOVEMBER.

1st. A flock of Fieldfares.

8th. Redwings seen.

16th. I flushed a Woodcock from an upland grass-field close to this house; it rose from the first of some furrows which lay broadside to the wind then blowing, the rest of the furrows in the field lay at right angles. The first half of the month was wet, and we had three gales, the last on the 15th and 16th, from S.W.

DECEMBER.

2nd. I saw a Peregrine Falcon near the village, and again a few days later in the meadows. It appeared to be an adult male.

NOTES AND QUERIES.

Nesting of the Dunlin in Wales.—I know not whether it is the aim of Dr. Bowdler Sharpe to embody comparatively recent ornithological discoveries in his new work on 'British Birds,' but in his latest issued volume—the 3rd—the author writes of the Dunlin as follows:—"nothing is known of its nesting in any part of Wales." From this it is manifest that Dr. Sharpe has been neglectful of the stores garnered by 'The Zoologist,' seeing that in the July number for 1893, at page 269, there is a reference to the Dunlin having been found breeding in Cardiganshire; while, again, in the July number for 1895, at page 275, there is another reference to the species which had been discovered nesting in Merionethshire. In his preface to the first volume Dr. Sharpe alludes to "a record of the distribution of birds throughout the British Islands," as being "a very important subject;" no one will deny this, or that 'The Zoologist' has for many years been regarded as the most suitable repository for current matters of interest relating to British Ornithology, and, as such, of presumed inestimable value to those who issue books on the subject. Nevertheless, it is essentially with a view to prevent, if possible, further dissemination of what is contrary to fact in the present day that I venture to send this note.—H. S. DAVENPORT (Skeffington, Leicester).

Song of the Icterine Warbler.—I am glad that my remarks on the song of the Icterine Warbler have called forth a note on the subject by so experienced an observer as the Rev. Charles H. Benson. His note is very interesting to me, especially with regard to a remark of mine that "perhaps the examples of *H. icterina* I found spending the breeding season in Africa were less imbued with spirit and energy than those which go further north in spring—it is quite possible." Mr. Benson states that although he heard the Icterine Warbler at the Hague singing a remarkable song, which he thought fully equal to that of the Nightingale, yet on subsequent occasions, when he encountered the bird again in two other localities, he did not hear "the sweet song," but heard it sing as described by Seebohm in the passage which in my paper I quoted as to my mind the best description Seebohm gave of the song. It would appear then, from Mr. Benson's observations, that the Icterine Warbler in Central Europe does not invariably give utterance to that song, the sweetness and melody of which have ravished the ears of some of those who have written about it. I certainly never heard this sweet song in Africa, although I have listened many times to the bird, and made sure of the singer more than once by shooting the specimen. Personally I never heard any bird utter notes to equal the finest of those of the Nightingale in their own peculiar quality; or any bird whose song resembled that of the Nightingale save the Marsh Warbler, and sometimes, more remotely, a very fine Song Thrush. But as, among Nightingales, there are some which are remarkably fine and brilliant singers, so there are others which are comparatively poor performers; and it must have been indeed a wonderful melody which, according to Hewitson, equalled, if it did not surpass, that of the Nightingale, unless Hewitson compared it with one of little merit. That the song of the Icterine Warbler, in a locality where it sings its best, would have, even to my ears, some resemblance to that of the Nightingale is very likely, for Seebohm speaks of it coming nearest to that of the Marsh Warbler, and a very wonderful song it must be if it does so, unless it wants all the Mocking-bird part. I have no wish to belittle the song of the Icterine Warbler, but rather to give the facts of my own observations, and once more to draw attention to the probable fact that birds inhabiting more or less widely separated localities in the breeding season (and therefore, whether resident or migratory, probably of different races), may differ in their song and habits. That birds do undoubtedly vary in the quality and the manner of delivery of their song in different localities seems certain. For one instance I would refer to Seebohm's remarks on the Crested Lark, Mr. Dixon's notes (which he quotes), and my observations on the same species (p. 127), which agree very much with Mr. Dixon's, made in the same country. Seebohm apparently knew the Crested Lark best in South Holland and Germany. I have hopes of hearing the Icterine Warbler again in the north of Europe next month, when perhaps I shall be treated to an exhibition of its finer song.—O. V. APLIN (Bloxham, Oxon).

Sussex Heronries.—It will be of interest to students of the Sussex avifauna to learn that the surmise expressed (p. 100) in reference to the breeding of Herons at Iden Wood, near Rye, has proved correct. Iden Wood is situated on the right of the highway from the village to Peasmarsh, and is about 100 acres in extent. On May 27th I found eleven nests placed in fine old oaks at an average height of about thirty-four feet. Four of the nests were empty, the young having left a few days before, as the keeper informed us; while one contained three eggs, and the rest had young mostly ready for leaving the nests. I found on climbing to the nest containing eggs, a Ring Dove's nest built immediately underneath and also containing eggs. The Herons have visited this colony for four or five years, but do not seem to have increased in number. I much fear that some of the nests have been disturbed, notwithstanding a declaration to the contrary from the keeper. The colony is favourably situated, and if protection were extended to its occupants it would no doubt speedily become one of the largest in the county. There is also a small settlement of Herons, of which I do not remember to have seen an account, in the Heron Wood, near Appledore, the property of Dr. Bernard.—W. RUSKIN BUTTERFIELD (Stanhope Place, St. Leonards-on-Sea).

On the Specific Validity of Brünnich's Guillemot.—As the beautiful plates of this bird in Lord Lilford's 'Birds of the British Islands' have only recently been issued, and as I have not seen any remarks on the subject in hand in any periodical devoted to Ornithology or otherwise, I should like to say a few words on the matter. I am the possessor of two out of the three specimens which were taken in this county (Yorkshire) during the exceptional winter of 1894-95, and examined all three in the flesh. Moreover, I have spent a great part of my time by the seaside, often with my gun, and always with my field-glass, and have examined a great number of Guillemots at various times. The facts recorded have come under my own personal observation; my conjectures may be right or they may be wrong; but if they lead to any elucidation of the difficulty I shall be glad. In my humble opinion, Brünnich's Guillemot is not a good species. I have examined many Guillemots that have been shot and washed ashore on the Yorkshire coast, have measured them, and noted their points of difference, and have come to the conclusion that they vary *inter se* to an enormous extent, both as regards size, colour of the soft parts, length and depth of bill, absence or presence of white line thereon, &c., and that no hard and fast line can be laid down as to where this species begins, and that ends. If a large series of skins were examined taken from birds frequenting the northernmost latitudes to which this species goes, right away down to the most southern point that they frequent, I believe that every gradation would be found between them. Lord Lilford himself, in his account of *U. bruennichi* in the last issued part of his work, says:—"I am

inclined to consider it as merely a large form of Common Guillemot; perhaps I should express my meaning more correctly by saying that I look upon our Common Guillemot as a local race of the species of which I am treating." On the other hand, Prof. Newton, to whom I wrote shortly after obtaining my specimens, replied that he considered Brünnich's Guillemot a good species, and states that the Guillemots inhabiting the Baltic are stated to be larger than those bred on the North Sea and Atlantic coasts of Europe, and some such bird I have, which I obtained about the same time as the two Brünnich's; it has a bill somewhat similar to Brünnich's, only the white line is fainter, but the tarsi and toes are those of the Common Guillemot. Then again, as I mentioned in 'The Zoologist' (1895, p. 71), I obtained what to all intents and purposes was a Ringed variety of Brünnich's Guillemot. (If the Ringed bird be only a variety—but I am very much inclined to think that it is as worthy of specific rank as the Brünnich's, and at any rate where I have had the greatest opportunities of observing it—at its breeding stations on the Yorkshire coast—it breeds true.) Unfortunately this bird was far too much damaged to be preserved *in toto*, and I was very busy at the time preserving my Brünnich's Guillemot and some Little Auks, but I managed to save the head and neck. The bill was short and stout, and the white line most distinct. The bird was very black on the upper parts, the white on the throat ran up to a point, and the tarsi and toes were of the Brünnich type. Now I have never heard of, or seen, a Ringed variety of Brünnich's Guillemot; but surely if the Ringed bird is only a variety of the Common, how comes it that there is not a Ringed variety of the at any rate closely allied Brünnich's bird, which "breeds in countless thousands in Greenland, Spitzbergen, and Novaya Zemlya" (Lord Lilford)? Structurally I can find no other distinctions between Brünnich's and the Common species than can be found in a large series of the latter. These are all interesting points; but probably, as pointed out by Lord Lilford, there is only one species, Brünnich's Guillemot, the others being local races. There are several points in the life-history of the Guillemot that require clearing up, apart from the question, what becomes of the immense hosts of northern birds after the breeding season? I have never been able to ascertain the simple fact as to the exact manner in which the young are conveyed down to the sea from the cliffs, though I have often tried to do so. I have seen with my glass the young one drop from the old bird, but as to how it was carried I cannot say. The cliff-climbers believe that the young are taken down either on the backs or in the beaks of the old ones; but, so far as my experience goes, this is certainly not the case on the Yorkshire cliffs: the young seem to be tucked up somehow underneath the old one, but as to the exact *modus operandi* I am still ignorant. It seems curious that, with the numbers of birds breeding round our coasts, and the ever-increasing numbers of

intelligent observers, we should still be in the dark as to exact facts, but so it is. Guillemots are found on our coasts very early in the year in nuptial dress. On January 20th, 1893, I saw several birds in full summer plumage, swimming close to my boat, a few miles off Scarborough.—OXLEY GRABHAM (Westfield House, Flaxton, York).

[As to the mode in which the Guillemot brings down its young from the cliff, see Zool. 1875, pp. 4342 and 4666.—ED.]

Nesting Habits of Cormorants as observed in Co. Donegal.—On May 9th I visited a breeding place of the Great Cormorant, or "Scart," and another of the Green Cormorant, or Shag (*P. cristatus*), about 300 yards apart, and a few miles from here. The breeding-places of both species are on low cliffs, about sixty feet, and less, vertically above deep water. The Green Cormorants, or Shags, occupy those at the mouth of a cave, as is their habit. The nests are placed in several instances only three or four yards below the upper edge, so that one can sit and watch them, with an opera-glass, in perfect leisure, for they never dream of leaving their nests. The two colonies are close together, but one consists almost wholly of "Scarts," the other largely of "Shags." The first thing that struck me with surprise was the appearance of Jackdaws on the scene. They had their nests in deep narrow fissures, and were on terms of perfect amity with the Cormorants. Several pairs of Jackdaws went in and out of these fissures, which were in some cases only a few inches from the nests of the Cormorants. Again, a pair of Ravens certainly breed close by, from their ceaseless din all the time I remained in the neighbourhood. This din is not the deep croak uttered by a Raven flying leisurely overhead, or at a season other than the breeding season. It is an angry, quick cry, and not nearly so deep. The Ravens went for the Jackdaws, but the latter eluded them easily, and considered it mere pastime. I imagine the Jackdaws are useful scavengers, and are tolerated for that reason. The Ravens probably fear no foe, but they are on good terms apparently with their sooty aquatic neighbours. The nests of the Cormorant are constructed, as is the case with many another bird, of the substances most easily obtainable. In this case the outer framework is in every case made of the dead wood of the burnt heather sticks. Burning heather to obtain young growth for pasture is an infamous practice which has reached a maximum on the mountains above these cliffs. The nests were lined also in every case with mosses gathered from the hills above. Indeed, when the nests are within a few yards of these materials, it would be rank stupidity to descend to the sea and after some difficulty obtain an inferior material to be carried *up*, not *down*. Some of the nests (of either species) were just completed. The next one might have eggs, while in many others the young were hatched and crying like little chickens. This irregularity in their breeding date may be compared with that of the individual in its incubation. The tribe

has the tendency of its component parts. I have found in a "Scart's" nest a fresh egg, one nearly hatched, and a couple of young birds. This was at Horn Head. While I watched, now and then a well-trained husband flew up with a fish, which he instantly placed in the beak of his mate, and which as instantly disappeared. They were brown fishes (rock-fish) about five or six inches long. I could discern no difference in the plumage of the male and female Shag. The female sits brooding with head and neck bolt upright, and when not fishing the male generally stands on the edge of the nest by her side—that is, on the assumption that it is the female that hatches. The Great Cormorant did not appear to me to be quite so uxorious, but hatched similarly. The notes of the Cormorants on their nests are curious: there is a deep note, not pitched much lower than that of a Guillemot's call to its young; this is, I think, the Shag's note of alarm. Then there is a wondrous and appalling deeper note which issues from the male Cormorant's throat—a warning of danger, but which always remains unheeded; it is so deep that it quivers and vibrates through the air like an organ tone, and I do not know any bird that can beat it—though it is not music. Another note which emanates from the Cormorant colony is an exact imitation of a sheep's bleat, except that it is rather too deep; to the best of my belief this came from the Green Cormorant, for I never heard it when visiting nesting places composed altogether of Great Cormorants, like that at Breaghy Head, near Horn Head. Lastly, the "intolerable stench" often referred to as belonging to these birds' nests was absent here. I have noticed it at Breaghy, where the nests were of seaweed, clumsy things compared with these, which are fairly tidy. The stench may come from the decomposing seaweed, which is not seen here. The Jackdaws may also be helpful in this direction, which is distinctly an improvement. — H. CHICHESTER HART (Carrablagh, Portsalon, Letterkenny).

Unusual Abundance of Golden Plover near Bath.—I was agreeably surprised, when on Lansdown this spring, to see large numbers of Golden Plover, *Charadrius pluvialis*. Every winter small flocks may be seen in the above locality, but I have never before noticed them in such abundance in this neighbourhood. I should think there were over four hundred birds, and seen on the wing, on a sunshiny day, it was a most beautiful sight.— C. B. HORSBRUGH (4, Richmond Hill, Bath).

A Plea for the Jay and Magpie.—In a recent notice in the 'Saturday Review' of a new ornithological work, the reviewer, after lamenting the decrease in our country of most of the more interesting birds, to make room for a monotonous plethora of game, remarked that the Jay and Magpie were getting very scarce, and he hinted that they were no particular loss, except from the point of view of the picturesque. A few lines further on he regretted the great and increasing abundance of Wood Pigeons. I have not the remotest idea who the writer of the review in question may be;

but, taking him from his writing to be a field-naturalist of some experience, the wonder in my mind is that it did not occur to him to connect these two facts together, because they seem to me to be cause and effect. The Jay and Magpie are great hunters of hedgerow and plantation, and have a keen eye for eggs, as every one knows. They are not seen much on the ground, but in hedges, bushes and low trees continually. Except in the acorn season, I hardly remember to have seen Jays on the ground. But from the places they frequent, the big white eggs of the Pigeons, placed conspicuously (from above) on a flat, dark-coloured platform, catch the eye of a Jay or Magpie at once. Indeed I have long regarded these two birds as the natural and chief check upon the Wood Pigeon. The Turtle Dove, whose nesting arrangements are similar to those of the Wood Pigeon's, is very much on the increase in this neighbourhood. I counted, a little more than a month ago, nearly thirty Wood Pigeons' and Turtle Doves' nests of last year (they are too flimsy to last much longer) in a small piece of a wood of certainly not two acres. It is not unusual to see thirty or more Turtle Doves rise from an acre or so of tares, and this at the end of May—not in autumn, when they are collecting to leave us, and when much greater numbers may be seen together. Blackbirds and Thrushes, again, are a great plague to gardens in some districts. I do not think that we should suffer from an excessive number of these, or of Pigeons either, if the Jay and Magpie, now pitilessly, and senselessly, harried towards extinction, were allowed to perform their legitimate function in the complex system of nature. No doubt they do at times what we are pleased, with a sad want of judicial impartiality, to call harm; but I do not think that, even on that account, too keen preservers of game are justified in relentlessly persecuting Jays and Magpies to the death because at times they expect their wages.—HENRY H. SLATER (Thornhaugh Rectory, Wansford, Northamptonshire).

Nesting of Short-eared Owl in Essex.—I have been much interested in finding a Short-eared Owl's nest on my island (Northey, Maldon), with eleven young ones, three out of the nest, two good snappers, and two just hatched, the rest graduated in pairs. Although I write "nest," there really is none, properly so called, the young being on the bare grass against a tussock. My man said two of the eggs were unhatched on May 26th. There are eighteen colts on the marsh, and the way the old Owls "go for" these my man says "is a caution," as good as any dog he ever saw!—EDWARD A. FITCH (Maldon, Essex).

Great Skua and Black-throated Diver in Somersetshire.—I have seen a Great Skua, *Stercorarius cataractes*, which was killed by Mr. W. Haselem at Berrow, near Burnham, in Dec. 1883. This, so far as I am aware, is the first recorded occurrence of this bird in Somerset. A Black-throated Diver, *Colymbus arcticus*, immature, was killed near Burnham on

Dec. 9th, 1893, and is in the possession of Mr. A. B. Percival, of Somerset Court. On Oct. 11th, 1893, a Sabine's Gull, *Xema sabinii*, in immature dress, was killed between Burnham and Steart Island, and is now in the collection of Sir O. Mosley, of Rolleston Hall, near Derby.—H. S. B. GOLDSMITH (King Square, Bridgwater).

Notes from Hastings.—We have had the usual spring visits of Hoopoes in this neighbourhood. So far as I have been able to ascertain, some half-dozen were here during parts of April and May. I had hopes that a pair or two would remain to breed, but I fear the birds that escaped the gunners have left us. A year seldom passes without bringing a few Hoopoes to our shore, and Mr. Howard Saunders tells of six being shot in one week by the Earl of Ashburnham's head-keeper. Since writing a note on the Hawfinch in 'The Zoologist' of last year (p. 272) I have heard of several nests of this species in the neighbourhood. Stock Doves appear to have quite forsaken the cliffs to the east of Hastings, where in 1879 Mr. J. H. Gurney frequently saw these birds, and thinks three or four pairs nested between the glens of Ecclesbourne and Fairlight. Mr. Borrer is of opinion that the species has of late years increased in this county. During the latter part of April very large numbers of migrating birds passed along the coast, and several times I heard the clamorous multitudes passing over the town late at night. In the early spring I paid daily attention to the migratory movements of the Pied Wagtail, and I was fortunate enough to see parties of birds arrive on many occasions during March and the early part of April. The birds usually reach the shore just after daybreak in the manner described by the late A. E. Knox, in his excellent and well-known account of the movements of this species (Orn. Rambles, letter vii.). Mr. Knox says that the birds remain in the neighbourhood of the coast for a few days after their arrival, and then proceed inland in a northerly direction. This is opposed to my own experience, for I have found that the birds disperse landwards shortly after alighting on the shore, and this I find is Mr. Borrer's experience. The late Mr. E. T. Booth expresses a conviction in the first volume of his 'Rough Notes,' that the White Wagtail appears on the Sussex coast later than the commoner species, and Mr. Borrer does not mention an earlier appearance than April 6th. I saw on the morning of March 24th three birds which I took to be examples of the White Wagtail, and I had a good opportunity of contrasting them with some of the commoner species whom they had probably accompanied across the Channel. I have seen no indication whatever of the West-to-East movement in species mentioned by Mr. Booth, and I am inclined to think this author was confounding spring with autumn when such movements do occur.—W. RUSKIN BUTTERFIELD (St. Leonards-on-Sea).

SCIENTIFIC SOCIETIES.

LINNEAN SOCIETY OF LONDON.

May 7th.—Mr. C. B. CLARKE, F.R.S., President, in the chair.

Mr. A. F. Crossman was elected a Fellow, and Professor Alphonse Milne-Edwards, Prof. Douglas H. Campbell, and Prof. C. O. Whitman, Foreign Members of the Society.

In view of the approaching Anniversary Meeting, the appointment of Auditors was proceeded with, when Messrs. W. Percy Sladen and A. Smith Woodward were elected on behalf of the Council, and Messrs. James Groves and F. J. Hanbury on behalf of the Fellows.

Mr. George Murray exhibited and made some remarks upon an engraved portrait of Charles Darwin, presented to the Society by Dr. F. Forscherheimer, of Cincinnati, to whom, on the motion of the President, a vote of thanks was unanimously accorded.

Mr. F. Enoch exhibited a series of lantern-slides illustrative of the metamorphosis and habits of the Tiger Beetle, *Cicindela campestris*. He described the peculiar position of the mandibles of the larva as adapted to its mode of capturing prey; the formation of the burrow; the spinous processes on the 8th segment of the abdomen used for supporting itself in the burrow; the mode of ejecting small stones or other obstacles met with in the course of work; and lastly, the changes incidental to the pupal state, and the adaptation of the burrow to the altered requirements of its inmate.

Mr. Enoch also exhibited living specimens of two minute aquatic Hymenoptera, viz. *Caraphractus cinctus*, Haliday (*Polynema natans*, Lubbock), which uses its wings in swimming. The other, *Prestwichia aquatica*, Lubbock, using its legs for propelling itself in the water, the wings being kept closed. This insect has not been recorded since its first capture in 1862.

Mr. H. M. Bernard exhibited preparations under the microscope of hermaphrodite glands of *Apus*, showing what he assumed to be the formation of sperm in the ovaries of four different species or varieties, and the condition of the eggs, which in two cases were being resorbed. These, he suggested, may have been parthenogenetic females in process of losing the female and assuming the male functions; possibly to ensure the presence of males in times of emergency, when "resting eggs" were required in order to tide over periods of drought.

Dr. H. A. Cummins, on behalf of Prof. M. M. Hartog, exhibited some hybrids of *Saraca* grown in the Botanic Gardens of Queen's College, Cork, from the collection of the late Wm. Crawford, of Lakelands.

Messrs. H. and J. Groves exhibited specimens of *Ranunculus tripartitus*, DC., recently discovered by Mr. R. A. Phillips in a small lake near Balti-

more, Co. Cork. Mr. J. Groves remarked that they were probably the most satisfactory examples of the true *R. tripartitus* which had been collected in the British Isles.

On behalf of Mr. W. E. Hoyle, Prof. Howes exhibited some Röntgen ray skiagraphs, showing the positions of a mouse when partially and completely swallowed by a snake, and showing the displacement of the jaws of the reptile during deglutition. The specimen of the snake was further interesting by way of showing a "half vertebra," about which in the *Ophidia* considerable discussion had arisen.

Dr. J. E. Aitcheson, C.I.E., exhibited some specimens of an Indian Woodpecker, *Dendrocopus himalayensis*, obtained on the Murree Hills at an elevation of 7000 feet, for the purpose of calling attention to an unrecorded habit of this bird of fixing walnuts in the bark of trees in order to extract the kernels. Dr. P. L. Sclater and Mr. J. E. Harting made some additional remarks on a similar habit of storing acorns recorded of a Californian Woodpecker, *Melanerpes formicivorus*, Bonap. (*Picus providus*, Jardine). So far as had been ascertained, no such habit had been observed, or at least recorded, in the case of the European Pied Woodpecker, *Dendrocopus major*, which is closely allied to the Indian species.

Dr. H. W. Marett Tims read a paper on the Tooth genesis in the *Canidae*, the main object of which was to trace the order of cusp-development and the inter-relations of the various tooth-cusps, and to examine the evidence thereby obtained bearing upon important and interesting problems of Phylogeny. The paper also dealt with the cingulum in relation to cusp-formation, and with the questions whether *pm.*⁴ or *m.*¹ more nearly approximates to the type tooth, and is therefore safest for the comparison of known forms, whether the milk or the permanent dentition is the more primitive, and whether *Otocyon* is primitive in both the number and characters of its teeth. A discussion followed, in which Mr. Martin Woodward, Mr. C. W. Andrews, and Prof. Howes took part.

ZOOLOGICAL SOCIETY OF LONDON.

May 5th.—Dr. JOHN ANDERSON, F.R.S., Vice-President, in the chair.

The Secretary read a report on the additions that had been made to the Society's Menagerie during the month of April, and called special attention to a young male Indian Elephant, *Elephas indicus*, from Burmah, obtained by purchase.

Mr. W. E. Hoyle exhibited a Röntgen-ray photograph of a Snake in the act of swallowing a mouse.

Mr. G. A. Boulenger read a paper on some little-known Batrachians from the Caucasus, based chiefly on specimens recently transmitted to the British Museum by Dr. Radde, of Tiflis, C.M.Z.S. Among these was an example of the new Frog of the genus *Pelodytes*, for which he had proposed

the name *P. caucasicus*. Altogether ten species of Batrachians were now known from the Caucasus.

Mr. F. E. Beddard read the second of his contributions to the Anatomy of the Picarian Birds. The present communication related to the pterylosis of the *Capitonidæ*.

Mr. M. F. Woodward read a paper on the dentition of certain Insectivores, and pointed out that there was strong evidence to show that the milk-dentition was undergoing reduction in this group as a whole, some of the milk-teeth in *Erinaceus* and *Gymnura* being present as small calcified tooth-vestiges only, while in *Sorex* there were apparently no calcified milk-teeth, but only vestigial milk-enamel organs. He concluded that $i. 3$ and $\frac{pm. 1}{pm. 1}$ were tending to be suppressed, and that the latter when present was a persistent milk-tooth, that $d. pm. 4$ was probably a true but precociously developed molar, $p. pm. 4$ being a retarded milk premolar. From a consideration of the ontogeny of the molar-cusps, he concluded that the true primary cone in the upper molars was Osborn's "paracone," its homologue in the lower jaw being the protoconid. From palæontological evidence, Mr. Woodward pointed out that there was not sufficient proof to justify the tritubercular theory as applied to the upper molars.

A communication from Mr. A. D. Bartlett contained some notes on the breeding of the Surinam Toad, *Pipa americana*, as recently observed in the Society's Gardens.

May 19th, 1896. — Sir W. H. FLOWER, K.C.B., LL.D., F.R.S., President, in the chair.

Mr. Sclater exhibited a Daguerreotype portrait of what was believed to be the first Gorilla that was ever brought alive to Europe. It was living in Wombwell's Menagerie in 1855. This portrait had been lent to Mr. C. Bartlett by Mr. Fairgrieve, formerly associated with Mr. Wombwell, who had sent with it an account of the animal and its habits.

A communication was read from Mr. G. E. H. Barrett-Hamilton on a variation in the pattern of the teeth of a specimen of the Common Field Vole, *Microtus agrestis*, in which the first upper molars on both sides had a small but well-developed extra enamel fold, giving three angles on the outer side and four on the inner side of each tooth and six cement spaces. A second communication from Mr. Barrett-Hamilton contained remarks on the existence in Europe of two geographical races or subspecies of the Common Field Vole. He considered the Field Voles of England, Belgium, and the North of France, and possibly of a large part of the Continent, as distinct from the Scandinavian animals, which would remain the typical *Microtus agrestis*, while the British and western continental form should be called *Microtus agrestis neglectus*, Jenyns. This view agreed with that of De Selys-Longchamps in 1847.

Mr. F. E. Beddard read the third of his contributions to the anatomy of Picarian birds. The present paper related to the variations in pterylosis and in anatomy of the *Alcedinidæ*, of which he had examined specimens. Although this family was so uniform in external structure, it presented considerable differences when the pterylosis and anatomy were examined.

Mr. de Winton described a new Rodent of the genus *Lophuromys* from British East Africa, which he named *L. ansorgei*. Its nearest ally was *L. sikapusi*, Temm.; but it differed externally in its larger size and in being of a smooth dark chocolate colour on all its upper parts, and, as regards the skull, in having a longer facial portion in comparison to the cranium.

June 2nd.—Mr. F. DUCANE GODMAN, F.R.S., Vice-President, in the chair.

The Secretary read a report on the additions that had been made to the Society's Menagerie during the month of May, and called particular attention to a Red-naped Fruit-Bat, *Pteropus funereus*, from Australia, acquired by purchase, and new to the Society's list; to four examples of a Tortoise belonging to the group of Gigantic Tortoises (apparently *Testudo daudini*) from the Aldabra Islands, deposited by the Hon. Walter Rothschild; and to two Rüppell's Vultures, *Gyps rueppelli*, from Egypt, received in exchange from the Zoological Gardens, Cairo.

Mr. Sclater exhibited the skin of an African Monkey of the genus *Cercopithecus*, originally received alive from Mombasa, which he believed to be referable to Stairs's Monkey, *C. stairsi*.

Mr. Sclater also exhibited a series of water-colour drawings of African Antelopes by Mr. Caldwell, and a photograph of the Gorilla now living in the Society's Gardens, by Mr. Henry Scherren.

A communication was read from Mr. Henry J. Elwes and Mr. Edwards, containing a revision of the European and Asiatic Butterflies of the Family *Hesperiidæ*. The species treated of in this paper were about 450 in number, and were divided into about 100 genera.

Mr. Charles Davies Sherborn gave an explanation of the plan he had adopted in preparing his 'Index Generum et Specierum Animalium.' He stated that the absence of any reliable lists of the species of particular genera had led him to commence the compilation of an 'Index Generum et Specierum Animalium' in 1890. Since that time 130,000 generic and specific names had been recorded in a manuscript which was stored at the Natural History Museum.

Mr. G. A. Boulenger read a paper on the dentition of Snakes, and added remarks on the evolution of the poison-fangs in this order of Reptiles.
—P. L. SCLATER, *Secretary*.

ENTOMOLOGICAL SOCIETY OF LONDON.

May 6th.—Prof. RAPHAEL MELDOLA, F.R.S., President, in the chair.

Mr. Percy Evans Freke, of Step House, Borris, Co. Carlow, was elected a Fellow.

Mr. Champion exhibited specimens of *Amara famelica*, Zimm., from Woking, Surrey, a recent addition to the British list. He also exhibited, on behalf of Mr. Dolby-Tyler, a series of *Eburia quadrinotata*, Latr., from Guayaquil, Ecuador, showing variation in the number of the raised ivory-white lines on the elytra.

Mr. Horace Donisthorpe exhibited a specimen of *Pterostichus gracilis* with three tarsi on one leg, taken near Weymouth last month.

Mr. G. T. Porritt exhibited a series of *Arctia menthastris* which he had just bred from Morayshire ova; the ground-colour of the specimens varied from the usual white, through shades of yellow, and dark smoky brown.

Mr. Merrifield exhibited specimens of *Gonepteryx rhamni* bred from larvæ found in North Italy and Germany, the pupæ of which had been subjected to various temperatures. He said that high temperature appeared to cause an increase of yellow scales in the female, and low temperatures generally reduced the size of the orange discal spot on the fore wings of both sexes. He also exhibited some bred specimens of species of *Vanessa*, the result of experiments tried with a view to ascertain the extreme of high temperature that the pupæ would bear, and its results. The species exhibited included *Vanessa atalanta*, *V. urticae*, and *V. antiopa*. Mr. Merrifield said that the effects on the imago produced by temperature were being made the subject of systematic research by Prof. Weismann, Dr. Standfuss, Mr. E. Fischer, and others. Mr. Elwes asked if these experiments had been made on pupæ only or on the larvæ as well. Mr. Merrifield said that the results were only noticeable when the experiments were made on pupæ. The effect of them on larvæ was not apparent.

Mr. Kirkaldy exhibited and made remarks on ova of *Notonecta glauca* var. *furcata*.

Mr. Tutt exhibited living larvæ of *Apamea ophiogramma*, together with the grass on which it was feeding. He said the species was formerly considered rare in Britain, but was now found freely in any localities where ribbon-grass (*Digraphis arundinacea*) was plentiful.

The Secretary read a communication from Mr. E. Meyrick on the subject of Prof. Radcliffe-Grote's criticisms contained in his paper published in the 'Proceedings' of the Society, 1896, pp. x–xxv, on the use of certain generic terms by Mr. Meyrick in writing on the group of Lepidoptera known as the *Geometridæ*. Mr. Meyrick stated that he rejected the main assumption on which the criticisms were based.

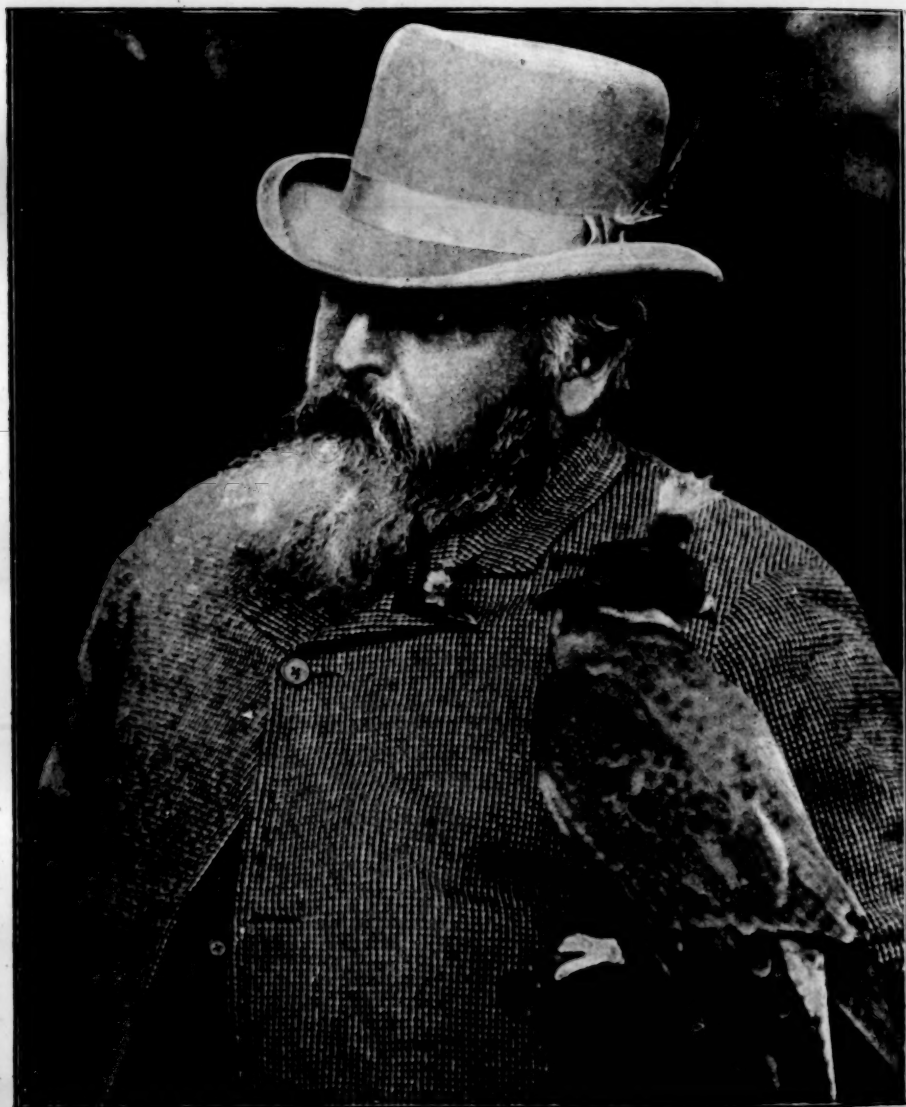
Mr. McLachlan opened a discussion as to the best means of preventing

the extinction of certain British Butterflies. He referred to the extinction of *Chrysophanus dispar*, *Lycæna acis*, and *Aporia crategi*, and to the probable extinction, in the near future, of *Papilio machaon*, and more especially of *Melitæa cinxia* and *Lycæna arion*. He stated that one of the objects he had in view in bringing this matter forward was to see whether some plan could not be devised to protect those narrowly localized species which were apparently in danger of being exterminated by over-collecting. Prof. Meldola said he fully sympathized with the remarks of Mr. McLachlan, and he thought that a resolution passed by the Society, possibly in conjunction with kindred Societies, might produce some effect. Mr. Goss stated that *P. machaon*, although apparently doomed to extinction in its chief locality in Cambridgeshire (Wicken Fen), would probably linger on in the county in smaller fens, such as Chippenham, where the larvæ had been found feeding on *Angelica sylvestris*. It would certainly survive in the Norfolk Broads, both from the irreclaimable nature of the fens there and the extensive range of the species in the district, which Mr. Goss said he had explored in 1887 in boats. He said that *M. cinxia*, although gradually disappearing from most of its old localities in the south of the Isle of Wight, was still found in the island further west in localities in which he had seen it in some numbers in May, 1895. He added that *L. arion* was far from extinct in Gloucestershire, and was distributed over a much wider area in the extreme south-west of England than was generally supposed. Its disappearance from South Devon was due to the burning of the grass, and the consequent destruction of the food-plant. Mr. Elwes stated that in the district in which he lived, in Gloucestershire, he had found *L. arion* in three or four places, on his own property, some ten or twelve miles distant from its known localities, but the species had disappeared of late years. The fact that *L. arion* had disappeared from his own property, where it was not collected, seemed to point to the fact that it was dying out from natural causes—perhaps owing to changes in climate not perceptible to us. Colonel Irby said that *L. arion* had disappeared many years ago not only from Barnwell Wold, Northamptonshire, but from another part of the county on the estate of Lord Lilford, not accessible to the public, and that its disappearance there was no doubt caused by the destruction of the food-plant and other herbage, by burning the pasture and by the grazing of sheep. Mr. Crowley, Mr. Tutt, Mr. Waterhouse, and Mr. Blandford continued the discussion. It was moved by Mr. Tutt, and seconded by Mr. Elwes, that a committee be appointed by the Council to investigate the matter and to report thereon. This was carried *nem. con.*

Mr. Guy A. K. Marshall communicated a paper entitled "Notes on Seasonal Dimorphism in South African Rhopalocera."

Mr. P. Cameron communicated a paper entitled "Descriptions of new species of Hymenoptera from the Oriental Region."—H. Goss, *Hon. Sec.*





THE LATE LORD LILFORD, F.L.S., F.Z.S.

PRESIDENT OF THE BRITISH ORNITHOLOGISTS' UNION.

(From a Photograph by Russell & Son.)